Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Tech.**
CEPE208

2nd Semester Back Examination 2017-18
ADVANCE STEEL STRUCTURE
BRANCH : STRUCTURAL & FOUNDATION ENGG, STRUCTURAL ENGG
Time : 3 Hours
Max Marks : 70
Q.CODE : C945

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
(IS:800-2007 and Steel Tables are allowed)
Answer all parts of a question at a place.

Q1 **Answer the following questions:** **(2 x 10)**

a) Show with the help of sketches different types of rivets.
b) State the assumptions in the analysis of welded joints.
c) Differentiate between braced and unbraced columns.
d) Define *slenderness ratio*.
e) Draw a sketch of staggered diamond pattern of rivetted joint.
f) What do you mean by residual stresses in steel members?
g) Define a *beam-column* with a sketch.
h) State the advantages of bolted connection over welded connection.
i) Draw a sketch showing the support details of a gantry girder.
j) What do you mean by *web crippling*?

Q2 **a)** Enumerate the various defects in welding. **(5)**
b) Describe the causes of fatigue in steel structures. **(5)**

Q3 Design a column to support a factored load of 1060 kN. The column has an effective length of 6.5 m with respect to z-axis and 5.0 m with respect to y-axis. Use steel of grade Fe 410. **(10)**

Q4 Calculate the strength of a 20 mm diameter bolt of grade 4.6 for the following cases. The main plates to be joined are 12 mm thick. **(10)**
a. Lap joint, b. Single cover butt Joint, the cover plate being 10 mm thick.

Q5 **a)** Calculate the value of least radius of gyration for a compound column consisting of ISHB 250 @ 536.6 N/m with one cover plate 300 mm x 20 mm on each flange. **(7)**
b) What do you mean by *moment magnification factor*? **(3)**

Q6 **a)** Explain different types of buckling of columns. **(5)**
b) What do you mean by *P-Δ effect*? **(5)**

Q7 Two plates of 16 mm and 14 mm thickness are to be joined by a groove weld. The joint is subjected to a factored tensile force of 400 kN. Due to some reasons the effective length of the weld that could be provided was 175 mm only. Check the safety of the joint if **(10)**

a) Single V – groove weld is provided
b) Double V-groove weld is provided

Assume the plates to be shop welded.

Q8 **Write short notes on any TWO :** **(5 x 2)**

a) Failure of welded joint
b) Block Shear
c) Shear Lag
d) Drift Criteria